C. REMARKS /ARGUMENTS

1. Status of the Claims

Claims 1-20 are currently pending in the application. Claims 1, 11, 12, 17, 18, and 19 are independent. Claims 1-10 depend on claim 1. Claims 13-16 depend on claim 12. Claim 20 depends on claim 19.

Applicant notes with appreciation that claims 1-11, 17, 19, and 20 have been allowed. Applicant also notes with appreciation that claims 13-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant has not rewritten claims 13-15 in independent form, in the belief that claim 12, upon which claims 13-15 depend, is allowable, as explained in detail in section 3 below.

2. Objection to Claims 14, 15, and 18

As can be seen in section B, claims 14, 15, and 18 have been appropriately corrected, in response to the Examiner's objections. The amendments to claims 14, 15, and 18 have been made solely to correct for the informalities that have been objected to by the Examiner, and not for any reason that is related in any way to the patentability of these claims. No new matter is added by these amendments.

3. Rejection of Claims 12, 16 and 18 under 35 U.S.C. § 102(b)

Claims 12, 16, and 18 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 5,822,393 to Popescu (hereinafter referred to as "Popescu").

The Applicant respectfully traverses these rejections.

Claims 12 and 16

The Examiner states:

"With respect to claims 12 and 16, Popescu discloses (Fig. 2) a CT system, comprising: an x-ray source (1) for generating x-rays (2) in response to a voltage provided by a voltage source (8); a detection system (3) for detecting x-rays (2) generated by the x-ray source (1) and transmitted through a target object (P); a kV meter (9) for measuring an energy spectrum of x-rays generated by the x-ray source (1); a processor for calculating the CT numbers of the target object (P); and a feedback controller (7) for providing to the voltage source (8) a voltage control signal; wherein the energy spectrum measured by said kV meter is used to adjust the voltage control signal so as to maintain the voltage substantially constant at a reference level established

during calibration. The detector system (3) includes an array of detectors (column 4; line 54 - column 5; line 58)."

Applicant respectfully disagrees.

Applicant submits that Popescu does not teach or suggest at least the following limitations in independent claim 12: 1) "a kV meter for measuring an energy spectrum of x-rays generated by said x-ray source;" 2) "wherein the energy spectrum measured by said kV meter is used to adjust said voltage control signal so as to maintain said voltage substantially constant at a reference level established during calibration;" and 3) "wherein said reference level is the voltage level at which calculation by said CT system of the CT number of a sample having a known CT number value yields the correct known CT number value."

Contrary to the Examiner's statement, Popescu does not teach, suggest, or mention any "kV meter (9) for measuring an energy spectrum of x-rays generated by the x-ray source (1)." The device referred to in Popescu with reference numeral 9 is not a kV meter, but rather a "data measurement system" (see e.g. FIG. 2 in Popescu, and Popescu specification Col. 5, line 11 (". . . a data measurement system 9 . . . "). The data measurement system 9 in Popescu is analogous to the data acquisition system described by Applicant (and indicated with reference numeral 82 in Applicant's specification and figures). The data measurement system 9 in Popescu is used to sample and measure **detector signals** generated by the detectors, not to measure the x-ray spectrum of x-rays generated by the x-ray source (1). See e.g. Popescu Col. 5, lines 20-22 "[t]he detectors of the bank of detectors 3 produces [sic] voltage signals at the 768 different detector channels which are sampled by the data measurement system 9"; Popescu Col. 6, lines 18-20 "[t]he voltage signals produced by the 768 detectors per projection are sampled by the data measurement system 9." As explained in Popescu (and as well known), these detector signals are indicative of the attenuation that the x-rays experience as the x-rays traverse the tissue or other material within the patient or other object, and the "voltage signals" that are described in Popescu as being sampled by the "data measurement system 9" are referred to as "projection data." See e.g. Popescu Col. 1, lines 29-31 ("The intensity of the transmitted x-rays striking on the bank of x-ray detectors is dependent upon the attenuation of the x-ray beam by the patient"); Col. 1, lines 34-37 ("The set of detector voltage signals, i. e. attenuation data, acquired for a particular x-ray source position relative to the patient is referred to as a "projection" . . . ")

In Popescu, there is no teaching, suggestion, or any mention of the measurement of the spectrum of the x-rays generated from the x-ray source (indicated in Popescu with reference numeral 1), nor is there any teaching, suggestion, or mention in Popescu of any kV meter. It is known that a kV meter detects x-rays generated from the x-ray source, before the x-rays pass through the patient or other target object, to measure the spectrum of the x-rays that are emitted from the x-ray source. It is easily seen from FIG. 1 of Applicant's application that the kV meter (indicated in Applicant's application with reference numeral 55) measures x-rays as they come out of the x-ray source (indicated with reference numeral 20 in Applicant's application), and that the kV meter 55 does not sample any signals from the detector array 50, i.e. does not sample any x-rays that have traversed the target object that is being imaged. In Applicant's specification, Applicant states that the kV meter (55) is connected to the x-ray source, and measures the energy spectrum of the x-rays generated by the x-ray source. See e.g. specification page 7, line 1 ("The method includes using the x-ray spectrum measured by a kV meter . . . "); specification page 10, line 4 (". . . the x-ray source 20 is connected to the kV meter 55 . . . "). In sum, 1) a kV meter is very different from the "data measurement system (9)" disclosed in Popescu, and 2) a kV meter is not mentioned or disclosed anywhere in Popescu.

Further, not only is there no teaching or suggestion in Popescu of a kV meter that measures the energy spectrum of x-rays generated by the x-ray source, but also there is no teaching or suggestion in Popescu that such an energy spectrum, measured by the kV meter, be used to adjust the voltage control signal provided to the voltage source by a feedback controller. Further, there is no teaching or suggestion in Popescu that the adjustment be so as to maintain the voltage substantially constant at a reference level established during calibration.

In the present application, Applicant discloses in numerous places in the specification that the energy spectrum measured by a kV meter is used to maintain the voltage constant. See e.g. specification page 7, lines 1-2 ("The method includes using the x-ray spectrum measured by a kV meter to keep the voltage constant against fluctuations from the reference level . . . "); specification page 10, lines 4-5, page 13 lines 22-23, and page 14 lines 22-23 ("the x-ray source 20 is connected to the kV meter 55, which includes a principal detector 52, and an auxiliary detector 54 . . . "; "Figures 3 (a) and 3 (b) illustrate the x-ray energy spectra as respectively obtained from the principal detector . . . and from the auxiliary detector . . . "; " . . . the primary

aspect of thix invention is to maintain the x-ray source voltage stable against fluctuations . . . "); specification page 12, lines 16-17 ("The energy spectrum of the x-rays strongly depends on the voltage provided to the x-ray source 20").

In contrast, Popescu is directed to minimizing x-ray dose to the patient during CT imaging, not to maintaining the x-ray source voltage constant. See e.g. Popescu Col. 2, lines 49 - 54 ("An object of the present invention is therefore to provide a method for a computer tomography system in which the total x-ray dose of an x-ray beam radiating through a patient during the acquisition of patient projection data is kept as low as possible without significantly increasing noise artifacts . . . "); Col. 3 lines 5-8 ("Thus the x-ray dose of the x-ray beam radiating through the patient during the acquisition of patient projection data per projection is substantially reduced . . . ").

Nowhere in Popescu is there any teaching, suggestion, or mention of maintaining the voltage from the voltage source substantially constant at some reference level. Finally, there is no teaching or suggestion in Popescu that such a reference level be the voltage level at which calculation by the CT system of the CT number of a sample having a known CT number value yields the correct known CT number value.

For these reasons, Popescu fails to teach or suggest the above-listed limitations of independent claim 12 of the present application. Claim 12 is therefore patentable over Popescu. Claim 16 depends on claim 12, and therefore includes all the limitations of claim 12. Accordingly, claim 16 is patentable over Popescu, at least for the same reasons claim 12 is patentable.

Claim 18

The Examiner states: "With respect to claim 18, Popescu discloses (Fig. 2) an apparatus for stabilizing CT number calculations by a system having an x-ray source (1) for generating x-rays (2) in response to a voltage provided by a voltage source (8), the apparatus comprising: a kV meter (9) for measuring a spectrum of x-rays (2) generated by the x-ray source (11) so that the voltage provided by the voltage source (8) can be adjusted to a reference level, and a feedback controller (7) for providing to the voltage source (8) a voltage control signal based on the measured x-ray spectrum so that the voltage can be adjusted in response to said control signal so as to maintain the voltage constant at the reference level, thereby substantially reducing, a variation in the calculated values of the CT numbers of a target object (P) (see abstract)."

Applicant respectfully disagrees.

For the same reasons as explained in detail above in conjunction with claims 12 and 16, Applicant submits that Popescu does not teach, suggest, or mention at least the following limitation of claim 18: "a kV meter for measuring a spectrum of x-rays generated by said x-ray source so that the voltage provided by the voltage source can be adjusted to a reference level at which the CT number of a sample as measured by said CT system is substantially equal to said known CT number value." As discussed in detail above, Popescu does not teach or suggest any kV meter for measuring the spectrum of x-rays generated by the x-ray source. Also, as discussed above, Popescu does not teach or suggest adjusting the voltage provided by the voltage source to a reference level at which the CT number a sample as measured by the CT system is substantially equal to a known CT number value.

Accordingly, Popescu fails to teach or suggest the above-discussed limitation of independent claim 18 of the present application. Claim 18 is therefore patentable over Popescu.

In summary, for all of the reasons above, Applicant respectfully requests that the rejection of claim 12, 16, and 18 under 35 U.S. C. 102 (b) as being anticipated by Popescu be withdrawn.

3. Conclusion

On the basis of the foregoing amendments, Applicant respectfully submits that all of the pending claims are in condition for allowance. An early and favorable action is therefore earnestly solicited. If there are any questions regarding these amendments and remarks, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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